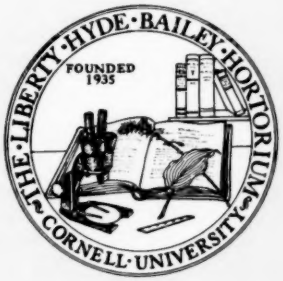
Baileya

A Quarterly Journal of Horticultural Taxonomy

Vol. 7 MARCH 1959 No. 1

The Japanese Species of Lycoris	1
Pinus contorta and its Variations	7
A Correction	10
The Cultivated Species of Oxalis 2. The Acaulescent Species	11
Notes on the Cultivated Compositae 3. Liatris	23
The Garden Huckleberry and the Sunberry	33
Book Reviews	22, 32, 36
Errata, Volume 6 (1958)	36



BAILEYA. - A quarterly journal devoted to the botany of cultivated plants and especially to their identification, nomenclature, classification, and history in cultivation. Editor: William J. Dress.

Price: $2.00 per year, net, postpaid, in funds payable at par in United States currency in New York. Single copies (current or back numbers): 50 cents each. Address subscriptions and requests for back numbers to The Bailey Hortorium, Cornell University, Ithaca, New York. Make all remittances payable to BAILEYA.

Notes and short scientific papers relating to the systematics of cultivated plants, and to their history in cultivation or to the literature pertaining to such topics, will be considered for publication to the extent that the limited space of the publication permits. Line illustrations to accompany such papers are invited. Authors of more than two pages of print will receive in recompense 15 copies of the issue in which their contribution appears. No proof will be submitted to the author and copy is considered in final form as received. Extracted reprints without change in pagination will be provided at cost [$2.00 per page per 100 copies, which is the minimum number which should be ordered].

BAILEYA
Vol. 7 March 1959 No. 1

Mailed at Ithaca, N. Y., March 31, 1959

The Japanese Species of Lycoris

Tetsuo Koyama[1]

Lycoris radiata, its deep red showy flowers forming a ring at the top of a quite leafless scape, will be strange enough to stimulate our botanical curiosity. Including this most common one, in Japan there occur seven species of wild Lycoris: viz., L. radiata Herbert, L. albiflora Koidzumi, L. aurea Herbert, L. sanguinea Maximowicz, L. kiushiana Makino, L. koreana Nakai, and L. squamigera Maximowicz. All these species bear a large ovoid bulb rather deeply in humus-rich soil, from which a fleshy cylindrical scape suddenly comes out from late in summer till early in autumn. Amaryllis-like beautiful flowers are disposed in an umbel terminating the scape. When the flowers are over, two-ranked leaves begin their elongation rather slowly through the bitter cold in winter.

The classification of the members of Lycoris has hitherto been made by the comparative length of stamens to that of the perianth segments. According to this method of classification, L. radiata, L. albiflora, and L. aurea form a group characterized by long stamens distinctly exserted beyond the perianth segments, while the others are placed in another group represented by stamens as long as or slightly shorter than perianth segments. As the result of cultivating these plants, the writer, however, has noticed that there is a considerable difference in time of anthesis among these species, and it is rather natural that this difference in anthesis is first taken into consideration.

Both L. squamigera and L. sanguinea flower in August following L. kiushiana which bears flowers in July, while in L. radiata and L. aurea flowers appear in October. This lag of anthesis just correlates with the elongation of leaves. Moreover, it is of interest that the anthesis and the leaf elongation show a reversed relationship. Namely, in the late-flowering group represented by L. radiata, shortly elongated new leaves can hardly be seen when the ovaries are getting enlarged, and they grow very rapidly up to about 3 dm. in length before the winter. These elongated blades, enduring the snow well, continue their assimilation activity until

[1]Visiting Professor of Biological Department, University of Ryukyus, from Botanical Institute, Faculty of Science, University of Tokyo, Japan.

the next March or April, when they wither. On the other hand, however, in the early-flowering group, representatives of which are L. sanguinea and L. squamigera, leaves never appear before the next January, though flowers are over in September. If we remove earth shallowly during the winter days, then we see a dormant bud being prepared at the apex of a large bulb. The buds begin their growth early in spring, and rapid elongation of leaves is continued until summer, when they wither. The division based upon the difference of anthesis also agrees well with some floral characters. Members of the late-flowering group have perianth segments strongly reflexed in anthesis with minutely wavy margins, and the stamens are conspicuously exserted beyond the perianth segments. The perianth of the members of the late-flowering group is neither reflexed in anthesis nor wavy-margined but only weakly curved outside with entire margins. Stamens of these flowers are almost as long as the perianth segments. As to the appearance of leaves, L. aurea seems to belong to the latter group, but all floral characters prove it to be better regarded as a member falling under the former category. Considering both vegetative and floral characters mentioned above, the seven Japanese plants are classified as follows:

1. Perianth segments clearly wavy along margins, reflexed in anthesis. Flowering from September to October.
   2. Perianth segments red or white, strongly reflexed. Leaves deep green with a longitudinal white stripe along the midrib.
      3. Flowers red. Leaves 5 to 8 mm. broad. . . . . 1. L. radiata
      3. Flowers white. Leaves 10 to 12 mm. broad. . . . . 2. L. albiflora
   2. Perianth segments golden-yellow. Leaves fresh green. Flowers fertile. . . . . 3. L. aurea
1. Perianth segments entire-margined, not reflexed. Flowering in August or so. Leaves present only between spring and summer.
   4. Flowers yellowish red. . . . . 4. L. sanguinea
      5. Stamens as long as perianth which is 5 to 6 cm. long. Flowering in August. . . . . 4a. var. sanguinea
      5. Stamens exserted beyond perianth. Flowering in July.
         6. Perianth 7 to 8 cm. long. . . . . 4b. var. kiushiana
         6. Perianth 5 to 6 cm. long. . . . . 4c. var. koreana
   4. Flowers light purplish pink. . . . . 5. L. squamigera

1. Lycoris radiata Herbert, Edwards' Botanical Register 4, Appendix: 20, 1821. Illustration: Botanical Register, t. 596. (Synonyms: Amaryllis radiata L'Héritier; Amaryllis aruniensis Thunberg, not Linnaeus; Nerine japonica Miquel)

This one is distributed both in Japan and along the Yangtze River valley in central China. So common and widespread is this species

Fig. 1. A, Lycoris aurea. B, Lycoris squamigera. Drawing by Miss Atsu Koyama.

that it has more than fifty vernacular names in Japan. Japanese people traditionally believe a superstition that this plant is possessed by the soul of a dead person, and thus lacks leaf when flowering, and so they never cultivate this plant for ornamental purposes, though the large showy flowers are worthy of admiration. Being triploid cytologically (3n = 33), this plant does not produce seed. The diploid race, from which the triploid race would have been originated, is a Chinese one called L. radiata var. pumila, which is a smaller plant with fewer flowers. When a triploid race is produced from a diploid one, it is often able to extend rapidly into a large area by means of strong vegetative reproduction. Indeed, in the triploid plants of L. radiata, propagation is carried on by the rapid formation of new lateral bulbs. It seems thereby to have been able to obtain its large distribution area in central China. But, as to the occurrence of triploid L. radiata in Japan, where no diploid race occurs, the human factor needs to be taken into consideration.

This plant must have been introduced into Japan from China occasionally with the traffic of men between Japan and China, because it is widely noted all over Japan both in lowlands and in the montane regions. However, the localities are always limited to such places as the edges of rice paddies or farms, the margin of plantations, or grassland around dwellings. Accordingly, as to its locality no datum has been received from any place not related to human activity at all. This evidence suggests that the triploid strain of L. radiata falls into the category of Prehistoric Naturalized Plants. This concept was first formulated by Dr. Maekawa who pointed out, in Acta Phytotaxonomica et Geobotanica 13: 277, 1943, that Japan has a number of plants involuntarily introduced with the traffic of men long before we had begun to record the so-called naturalized plants. Historically speaking, most of these plants must have been introduced from China and its adjacent regions.

2. Lycoris albiflora Koidzumi in Botanical Magazine, Tokyo 38: 100, 1924. Illustration: Acta Phytotaxonomica et Geobotanica 13: 19 & pl. 2, 1943.

This species differs from L. radiata Herbert in its larger habit, white flowers, and broader leaves. Dr. Makino (Acta Phytotax. et Geobot. 13: 18, 1943) supposed this plant to be a hybrid between L. radiata and L. aurea. Especially, the broad somewhat yellowish leaves with a rather inconspicuous white stripe show just an intermediate state between the two. So far as the shape of flowers is concerned, this rather approaches L. aurea. Dr. Inariyama's cytological observation has recently indicated this supposition to be correct.

3. Lycoris aurea Herbert, Edwards's Botanical Register 4, Appendix: 20, 1821. Illustration: Fig. 1A. (Synonyms: Amaryllis aurea L'Héritier; Nerine aurea Bury)

This species has a relatively wide distribution area extending into southeastern Asia, from Japan through the Ryukyus southwards to Formosa and Indo-China. Cytologically, three chromosomal races have been detected by Dr. Inariyama (1952).

4. Lycoris sanguinea Maximowicz in Engler, Botanische Jahrbücher 6: 80, 1885.

4a. var. sanguinea. Illustration: Makino, Illustrated Flora of Japan, f. 2165, 1949; Fig. 2a.

Fairly common in Japan next to L. radiata, this plant grows in and around forest on relatively low hills. It is not only Japanese, but is also distributed in central China. In vegetative parts, the main differences between this species and L. radiata are the former's whitish-green leaves lacking a longitudinal white stripe and the comparatively smaller bulbs.

4b. var. kiushiana var. nov.[1]; Makino in Makinoa No. 9: 1948, as a synonym; Ohwi, Flora of Japan ed. 1, 328, 1053, description in Japanese only. (Synonym: Lycoris kiushiana Makino, l. c. 176, 1948, description in English only.)

Dr. Makino described this botanically interesting taxon from the foot of Mt. Taradake in the northern part of Kyushu, Japan. Recently a few localities have been added in the northern Kyushu, Shikoku, and the Pacific coast of Honshu. This differs from typical L. sanguinea by the larger size of flowers and the longer stamens distinctly exserted from the perianth, in addition to having earlier anthesis.

An interesting problem is the relationship with the following Korean plant, named L. koreana by Dr. Nakai. Lycoris koreana can be distinguished from var. kiushiana in its smaller size of perianth as described in the above key, and from typical L. sanguinea by the long-exserted stamens. Taxonomically speaking, when "L. kiushiana" is regarded as a variety of L. sanguinea, a varietal rank should

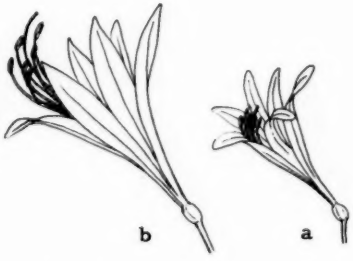


Fig. 2. Lycoris sanguinea: a, var. sanguinea; b, var. kiushiana.

[1] L. sanguinea Maximowicz var. kiushiana differt a typo floribus multo majoribus, staminibus longe exsertis. Holotype: Mt. Taradake, Prov. Hizen in Japan. Coll. T. Makino. (Makino's Herbarium, Tokyo).

also be granted to L. koreana. Since the latter has long stamens, it is thought to be rather nearer to var. kiushiana than to typical L. sanguinea. Moreover, a specimen of var. koreana from Tsushima Island was found in the herbarium of the University of Tokyo. These data prove that var. koreana and var. kiushiana geographically show the so-called Korean-Japanese link, whereas typical L. sanguinea falls under the category of the so-called Japano-Chinese link. From their distribution areas, these two groups of plants are regarded as having been distributed into Japan through different courses, respectively. If both var. sanguinea and var. koreana were differentiated from a prototype in China, var. koreana would have tended into Japan from southern Korea with some characteristic differentiation as seen in var. kiushiana, while typical var. sanguinea would have come to Japan directly from central China. According to Dr. Haga, the karyotype of var. kiushiana from Kyushu is quite the same as that of var. sanguinea, though no cytological data are available as to var. koreana. The nomenclature of var. koreana is given below:

4c. var. koreana (Nakai) T. Koyama, stat. nov. (Synonym: Lycoris koreana Nakai in Botanical Magazine, Tokyo 44: 516, 1930)

5. Lycoris squamigera Maximowicz in Engler, Botanische Jahrbücher 6: 79, 1855. Illustration: Fig. 1B.

This Japanese species is occasionally cultivated as an ornamental plant, and is also found growing wild in wet soil in lowlands. Its broad whitish-green leaves look just like those of Narcissus, its ovoid-conical bulb may be the largest (up to 20 cm. in length) of these five species. Dr. Inariyama determined this species to be a hybrid between L. Sprengeri and L. straminea, both hardy Chinese species. It is true that these two somewhat resemble L. squamigera also in external appearance, but the problems left unsolved are that neither L. Sprengeri nor L. straminea occurs in Japan, to which L. squamigera is restricted, and that L. squamigera outwardly lacks any intermediate character by which we can suppose this to be a hybrid between the two.

Pinus contorta and its Variations

F. R. Fosberg[1]

As a student in 1929, during one of my first experiences with high-altitude vegetation, I saw on Mt. San Gorgonio in southern California a remarkable species of pine. Its trunks were short and conspicuously thick in proportion to their height, almost elephantine in appearance. The bark was very smooth for a pine and a dull flesh-pink in color. The needles were short, broad, and in two's. Growing not far below timberline, it had the short stubby appearance that often characterizes high-altitude trees.

Later I inquired of my botany professor what pine this could be. He replied that it was the lodgepole pine or tamarack, Pinus contorta var. Murrayana. Here was a puzzling thing, as well as an introduction to the peculiarities of vernacular names of plants. I remembered tamarack from my northern childhood and this was not it. Had I had the temerity to persist with the inquiry I would have found that tamarack could mean either Pinus or Larix, depending on the place. But the name that really seemed discrepant was lodgepole pine. I had read of it as a slender pine, as the name would imply. In no sense could this name be appropriate for what I had seen on Mt. San Gorgonio. Later questions brought out the information that Pinus contorta was variable, and that its typical form was a dwarf pine, growing along the seashores in northern California, which looked even less like my mountain tree than the latter did like a lodgepole.

Here the matter rested for almost 20 years, except for other visits to the southern California mountain stands of the tree which only served to confirm my first impressions. Then, in 1948, I was able to see the little pines of the Northwest Coast near Crescent City, and only a few days later, fine pure stands of tall slender lodgepole pine at West Yellowstone, Montana. These latter strikingly satisfied the implications of the name lodgepole pine. I was also impressed with their similarity to Pinus virginiana, the eastern scrub pine, even to blackish-brown bark.

[1]Falls Church, Virginia

The difference between the three types was so striking that I studied specimens in the herbarium to see if they could really be the same species. The material available showed rather little tangible difference. The coastal plants had narrower leaves and were generally named Pinus contorta in contrast to Pinus Murrayana for the inland ones. There was no suggestion either on the herbarium sheets or in what I found to read that the southern California trees were in any way different from those of the Rocky Mountains.

In 1956 I had a chance to examine stands of lodgepole on Mt. Evans, near Denver. There was no suggestion of the thick trunks, the stubby habit, or the pink bark of the California trees.

In 1957, driving across the Sierras at Sonora Pass, I encountered the same tree I had seen in southern California, thick trunks, pink bark, and all. One trunk was almost four feet thick near the base. The same summer I made further comparisons with trees in the Tetons, Jackson Hole, and Yellowstone. I then concluded that the reduction of the California and Rocky Mountain plants to a single variety of one species must be the result of undue preoccupation with herbarium specimens and lack of field observations.

After this I looked up the literature more thoroughly and found that separate varietal names did, indeed, exist for these two populations, but that they had generally been ignored. It also seemed, from careful observation of herbarium material, that the two could usually be distinguished by leaf width and that their cones did not look alike, those from California being much more slender and less knobby.

This study of herbarium material and literature also made it quite evident that the species covers an enormous geographical range through the mountains of the western United States and Canada and along the Northwest Coast, and is cultivated occasionally, though more frequently in Europe and New Zealand than in America. The variation indicated was so wide that I hesitated to write anything based on the little knowledge that I had gained, and there the matter rested.

I was therefore more than gratified to find in 1957 that a comprehensive study had been made of the variation in this species.[1] Its author was kind enough to send me a copy. The paper turned out to be one of the most thorough and admirable studies of geographic variation in a plant species that I have seen.

It is based on statistical analysis of sampling much more carefully thought out and adequate than is usual in taxonomic work and

[1] Critchfield, W. B. Geographic Variation in Pinus contorta. Maria Moors Cabot Foundation Pub. 3: 1-118, 1957.

covering much of the geographic range of the species, as well as on detailed studies of cultivated material of known origin and on experiments with germination and seedling morphology and phenology.

The author concludes that there are four geographic "subspecies" in Pinus contorta Loudon but that they are not very sharply defined. They must be separated on the basis of a number of sets of characters, rather than on complete reliance on any one. These subspecies seem equivalent to what most systematists would call varieties[1], and names are available for them in varietal rank and will be used below. One is the dwarf plant of the Northwest Coast; one is the Sierra-Cascade form, extending to southern California (and probably Baja California), though samples were lacking south of the Sierras; another is the Rocky Mountain-Intermountain slender form; and the fourth is a very local dwarf tree of the acid white plains of Mendocino Co., California, which has previously been called Pinus Bolanderi Parlatore.

The author gives a thorough survey of what has been written previously on the complex, and in the end summarizes the essential facts of taxonomic significance from his vast amount of data. Curiously, nowhere does he mention the striking differences in habit and bark color described above. He does not provide a key to his subspecies, obviously because of the difficulty in picking out characters that do not overlap. However, using his data along with observations of my own, I have attempted to construct a key that will work at least in the majority of cases. This is presented below, using the appropriate varietal rather than the subspecific names used by Dr. Critchfield.

One of the striking features of his work is the demonstration of the unreliability, in this species, of some of the characters that are generally considered fundamental in the taxonomy of pines. Among these are such anatomical characters of leaves as the number and location of resin ducts and vascular bundles, and morphological ones such as the character of the cone, its position, whether it is persistent or deciduous, serotinous or not. Overlapping variability and inconstancy seem to be the rule in this species for microscopic as well as gross characters. Hence the following key may prove difficult to use and in some cases unreliable.

1. Leaf width between 1.4 and 2.2 mm. when dry; trunk massive, bark pinkish; cones symmetrical, shedding seeds shortly after maturity, deciduous not long afterward, apophysis flattish, vascular ring in peduncle thin. (In the Sierra Nevada, north in the Cascades to the Columbia River, south in isolated patches in the high mountains of southern California and the San Pedro Martir, Baja California, Mexico.) . . . . . .P. contorta var. Murrayana (Balfour) Engelmann[2]

[1][Ed. note: cf. Dr. Fosberg's article "Subspecies and Variety" in Rhodora 44: 153-157, 1942.]

[2]The four taxa here regarded as varieties are treated as subspecies in Dr. Critchfield's paper: subsp. Murrayana (Balfour) Critchfield; subsp. latifolia (Watson) Critchfield; subsp. Bolanderi (Parlatore) Critchfield; and subsp. contorta.

1. Leaf width mostly 1.3 - 1.7 mm.; trunk slender, bark light brown to blackish brown; cones often asymmetrical, persistent, often serotinous, apophysis hard on lower scales, somewhat conic or mammillate, vascular ring in peduncle thick.

   2. Leaves mostly more than 5 cm. long; trees tall and slender, mostly over 11 m. high at maturity; cones moderately heavy and tuberculate, usually more or less at right angles to branch, seldom strongly reflexed. (Inland in distribution, especially in the Rocky Mts. south to southern Colorado and the intermontane region, and extending far north in Canada, east to the Black Hills.). . . . . P. contorta var. latifolia Watson

   2. Leaves mostly less than 5 cm. long; trees short, dwarfed, mostly less than 11 m. tall at maturity; cones heavy, strongly asymmetrical, and reflexed.

      3. Leaves mostly less than 1.4 mm. wide, lacking resin canals; cones heavy, strongly asymmetric, serotinous. (Confined to the acid white plains not far inland from the coast in Mendocino Co., California. Intergrading with var. contorta.). . . . . P. contorta var. Bolanderi (Parlatore) Lemmon

      3. Leaves mostly 1.4 - 1.7 mm. wide, usually with 2 resin canals; cones medium-heavy, persistent but usually shedding seeds soon after maturity. (Coastal in distribution, from southern Alaska to Mendocino Co., Calif.; seeming to intergrade with all other varieties.). . . . . P. contorta var. contorta

A CORRECTION

Dr. H. P. Traub, author of "The Amaryllis Manual" reviewed in Baileya 6: 213-215, 1958, has kindly pointed out that the names Amaryllis gh. leopoldaeoides and A. gh. reginaeoides were validly published in Plant Life 13: 62, 1957. The possible presence of Amaryllis reginae genes in the latter was clearly indicated therein. It is unfortunate that these names were not located in an earlier search through the journal series. Dr. Traub writes that general indices were started in 1958 and will be published in due course.

Some words of explanation were deleted from the last paragraph of the review due to restrictions of space. It had been pointed out in manuscript that "the epithet of a species may be taken from any source whatever, and may even be composed arbitrarily" according to the botanical code. Thus epithets such as maracasa and minasgerais may not be rejected though they do not conform to recommendations that most botanists find useful and meaningful. The same may be said of leopoldaeoides and reginaeoides - inadvertently modified in the review - even though they follow no generally recognized rules of composition.

H.E.M., Jr.

The Cultivated Species of Oxalis
2. The Acaulescent Species

John Ingram

Besides being comprised of a large number of species, the genus Oxalis also represents a very natural genus with only a few strikingly bizarre forms which are at once distinguishable from all other species without close and careful examination. This overall great resemblance is particularly evident among certain acaulescent species and adds greatly to the difficulty of absolute identification of those which are most closely related.

The person attempting to classify properly the various species of Oxalis which are found in cultivation is faced with the problem of not knowing, in all cases, the range of variation within a particular species as it occurs in nature; nor does he always know enough about those related to it, especially the indigenous ones which are not known to be in cultivation. Our problems of this kind, involving the South African species, have been alleviated greatly by the extensive study of Salter ("The Genus Oxalis in South Africa," The Journal of South African Botany, supplement no. 1, 355 pp., 1944), who made an eleven-year study of these plants both in the wild and in the garden while gathering data for his revision. Fortunately, work toward a modern monograph of the South American species is under way, and certain other groups are being investigated. These studies will help us eventually to clear up existing problems but, in the meantime, we will have to be satisfied with what information we have at hand, bearing in mind that further research may lead ultimately to new concepts of species already well known in horticulture. This may involve name-changes of species that have been in cultivation for a long time.

The acaulescent species of the genus are, for the most part, readily and easily distinguishable from the caulescent species because their stems rarely ever rise appreciably above ground level. However, some species have extensive rhizomes which remain underground. Occasionally a small portion of the tip of the stem will be seen above the surface of the soil (Fig. 7a), but the usual total aspect of the plant reveals only a clump of leaves and inflorescences in contrast to the caulescent species with their elongated leafy stems.

[1] "The cultivated Species of Oxalis, I. The Caulescent Species" was published in Baileya 6: 22-32, 1958.

As is to be expected in a genus like Oxalis which represents a natural group, there is a certain likeness shared by the species which makes them all resemble one another. The flowers of the various species are essentially uniform throughout the genus, aside from the normal variation in size and color. The diversity of morphology is centered in the vegetative structures where one finds enough variation in the leaves and underground stems to determine the names of cultivated species of Oxalis without having to know any more about the flowers than the color of the corolla and that the number of flowers in each inflorescence is one, two or three, or several to many.

It is fortunate that one need not make as much use of the flower as one usually does when keying most plants, because, so often, it is necessary to work with dried plants, and dried flowers of Oxalis are not easily restored to a semblance of their fresh condition by the usual practice of boiling in water. Boiled Oxalis flowers tend to go to pieces, and dried petals do not separate entirely and completely from each other, so that often it is impossible even to be certain of their shape. It is an advantage to have plants growing in the garden because fresh flowers can be dissected easily.

As a rule, in practically every key to either indigenous or cultivated species of Oxalis, flower color will be used as a means of separating the yellow-flowered species from those having any other color but yellow. This character seems to be a useful one for separating the species into these two groups, but one must be cautioned against depending too heavily on flower color because, even though some species normally produce white flowers, many of them which characteristically have purple, violet, or rose flowers, such as O. rubra, often produce forms that have white flowers; these variants appear in the trade as form, variety, or cultivar alba.

The number of leaflets in a leaf sometimes varies between the first leaves produced on a young plant and those produced when the plant is older, so it is wise, when keying a plant, to count the leaflets of the later leaves. This condition is more critical for plants which key under leaves with 2 or 3 leaflets, than it is for those species having 9-22 leaflets. Figures 3-7 show some of the shapes and leaflet numbers which occur in species of Oxalis.

The bulb is the most common type of underground stem found in this group of plants; it may be simple (Fig. 4a) or compound (Fig. 5A). The simple bulb of Oxalis Bowiei as shown in Fig. 4a represents a young bulb with only a few bulb-scales. Simple bulbs will, in time, produce more bulb-scales but they will never become compound as in O. corymbosa (Fig. 5A). As this illustration shows, compound bulbs are those with bulbils formed in the axils of bulb-scales. Bulbs are frequently associated with a thick,

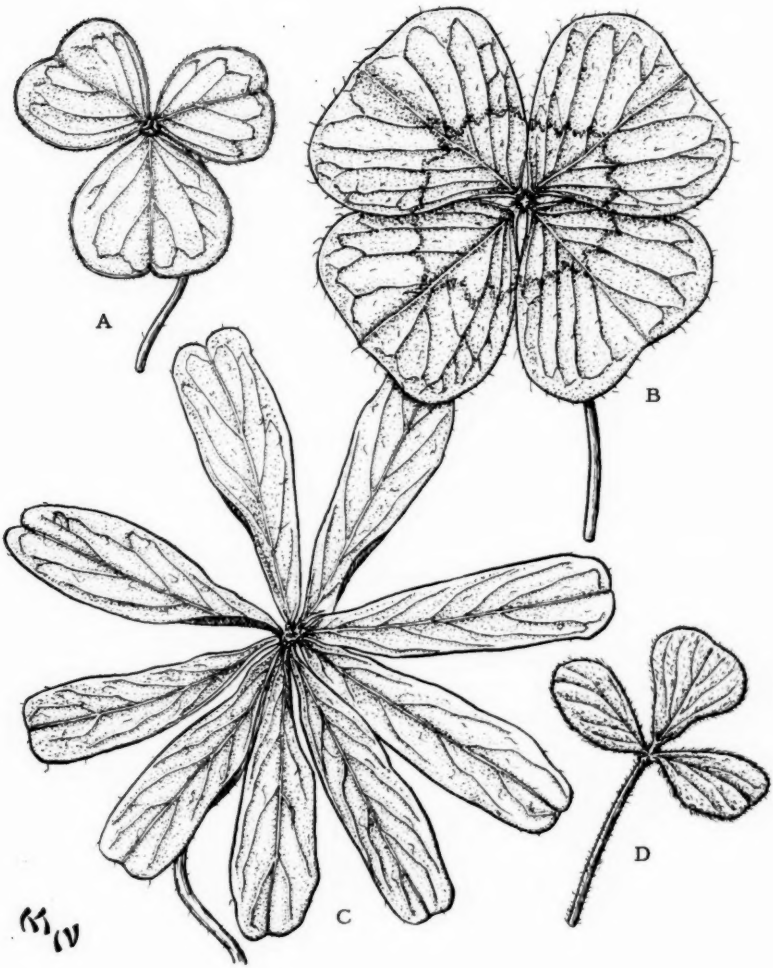


Fig. 3. A, Oxalis braziliensis, leaf x 1. B, Oxalis Deppei, leaf x 1. C, Oxalis lasiandra, leaf x 4/5. D, Oxalis melanosticta, leaf x 1.

fleshy, contractile root (Figs. 4a and 5A). The other types of underground stems are scaly rhizomes (Fig. 7a) and compact, cylindrical, rather woody rhizomes (Fig. 6b).

If one examines the leaves of Oxalis rubra, one will notice that the margins of the leaflets are dotted with specks of orange, or, in dried leaves, of black (Fig. 6c). These spots are typical of this species and some other species of Oxalis, but they have been mistaken for the rust, Puccinia oxalidis (Lévl.) Diet. & Ell., which has been found on a few species of Oxalis. Metcalfe and Chalk (Anatomy of the Dictyledons 1: 301, 1950) report, "Secretory cavities ... containing either brown or red, sometimes transparent and crystalline substances, [are] present in the pinnules of Oxalis spp., from both South Africa and America." In O. purpurea these secretory cavities are transparent in the green living leaf and are noticeable only when the leaves are dried, appearing then as black streaks and dots on the underside of the leaflets.

The following key accounts for the acaulescent species of Oxalis which have been offered in the trade in the United States since 1940. Some of them have been garden favorites for many years, whereas others come and go or remain in the trade only a year or two and then disappear altogether.

Key to the Cultivated Acaulescent Species of Oxalis

1. Flowers solitary on the peduncles.
   2. Flowers entirely yellow.
      3. Leaflets 5 to 12. . . . . O. flava
      3. Leaflets 2 or 3.
         4. Plants glabrous; leaflets usually 2, mostly elliptic to oblanceolate, the petiole winged (Fig. 5B) . . . . . O. fabaefolia
         4. Plants hairy; leaflets 3, obovate to obcordate, the petiole not winged.
            5. Leaves mostly obcordate, not ciliate with shining white hairs; peduncles 1 1/2 to 2 times longer than the petioles; flowers lined or dotted with red. . . . . O. lobata
            5. Leaves mostly cuneate-obovate (Fig. 3D), ciliate with shining white hairs; peduncles and petioles about the same length; flowers entirely yellow. . . . . O. melanosticta
   2. Flowers purple, lavender, rose, pink, or white, but never entirely yellow (though sometimes with a yellow base).
      6. Leaflets 9 to 22.
         7. Rhizomes not scaly; leaflets in 1 whorl; flowers pink with a purple base. . . . . O. adenophylla
         7. Rhizomes scaly with persistent leaf-bases; leaflets usually in 2 whorls; flowers white with lavender veins, or rosy-pink. . . . . O. enneaphylla
      6. Leaflets 3.
         8. Leaflets to 5 mm. long, glabrous. . . . . O. magellanica

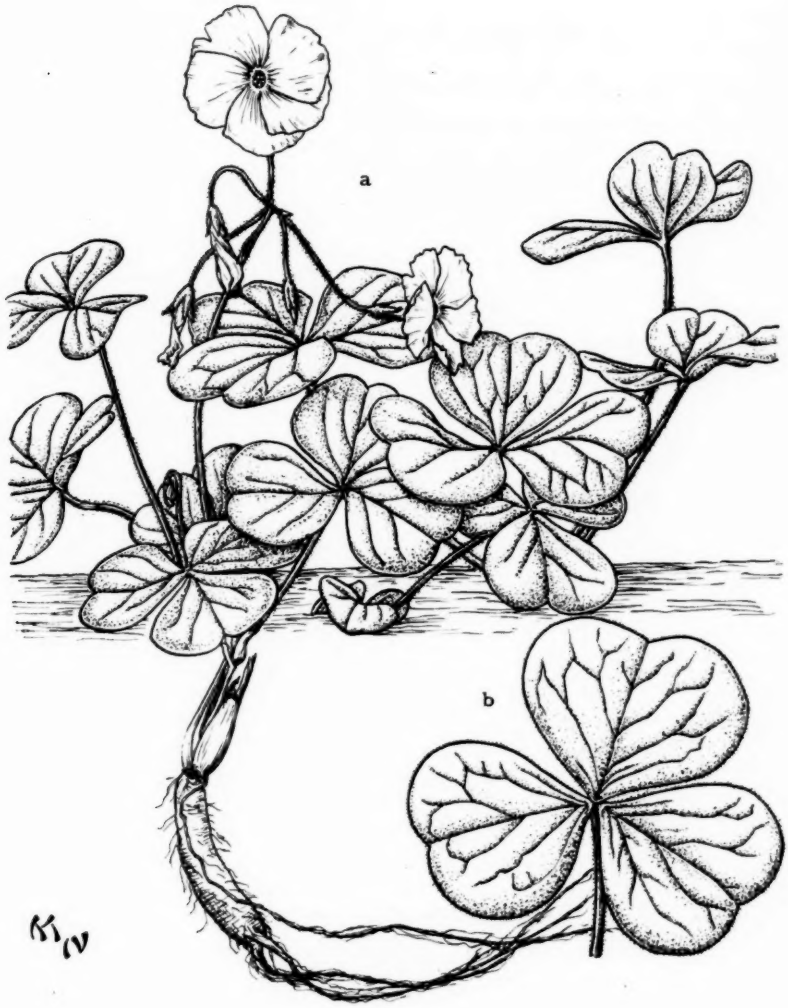


Fig. 4. Oxalis Bowiei: a, habit x 3/5; b, leaf x 2/3.

8. Leaflets 12 mm. or more long, pubescent at least on the lower surface.

9. Leaflets orbicular-obovate with pellucid dots which turn black on drying. . . . . O. purpurea

9. Leaflets obcordate, pellucid dots absent.

10. Plants to 8 cm. high; leaflets about 13 mm. long; petals white with purple veins. . . . . O. Acetosella

10. Plants 8 to 26 cm. high; leaflets mostly at least 25 mm. long; petals rosy-pink or sometimes white. . . . . O. oregana

1. Flowers 2 or more in a scapose umbellate or cymose inflorescence, occasionally an inflorescence with only one flower present on the same plant with 2- or 3-flowered inflorescences.

11. Flowers entirely yellow. . . . . .O. Pes-caprae

11. Flowers purple, magenta, violet, rose, pink, or white, never entirely yellow (but sometimes with a yellow base).

12. Leaflets 4 to 22.

13. Leaflets lingulate-cuneate (Fig. 3C). . . . . .O. lasiandra

13. Leaflets ovate, obcordate, or suborbicular.

14. Leaflets 9 to 22. . . . . O. adenophylla

14. Leaflets 4.

15. Leaflets obovate to suborbicular, the apex rounded or truncate (Fig. 3B). . . . . .O. Deppei

15. Leaflets obcordate . . . . . O. tetraphylla

12. Leaflets 3.

16. Leaflets obcordate, orbicular-obcordate, suborbicular, or obovate.

17. Sepals, pedicels, peduncles, and petioles with glandular hairs (non-glandular hairs also may be present) (Fig. 4). . . . . .O. Bowiei

17. Sepals, pedicels, peduncles, and petioles hairy or glabrous, but never having glandular hairs.

18. Petals deeply notched at the apex. . . . . .O. trilliifolia

18. Petals entire or serrulate but not deeply notched at apex.

19. Peduncles bearing 2 or 3 flowers, sometimes some peduncles only 1-flowered. . . . O. braziliensis

19. Peduncles bearing several to many flowers.

20. Plants with compound bulbs (Fig. 5A). . . . . .O. corymbosa

20. Plants with fleshy cylindrical rhizomes (Fig. 6). . . . . O. rubra

16. Leaflets obreniform (Fig. 5E), obdeltoid (Fig. 7b), V-shaped, to strongly 2-lobed with the lobes diverging.

21. Plants with bulbs.

22. Leaflets obreniform, with 2 callose spots present on the lower surface at the sinus (Fig. 5E) . . . O. violacea

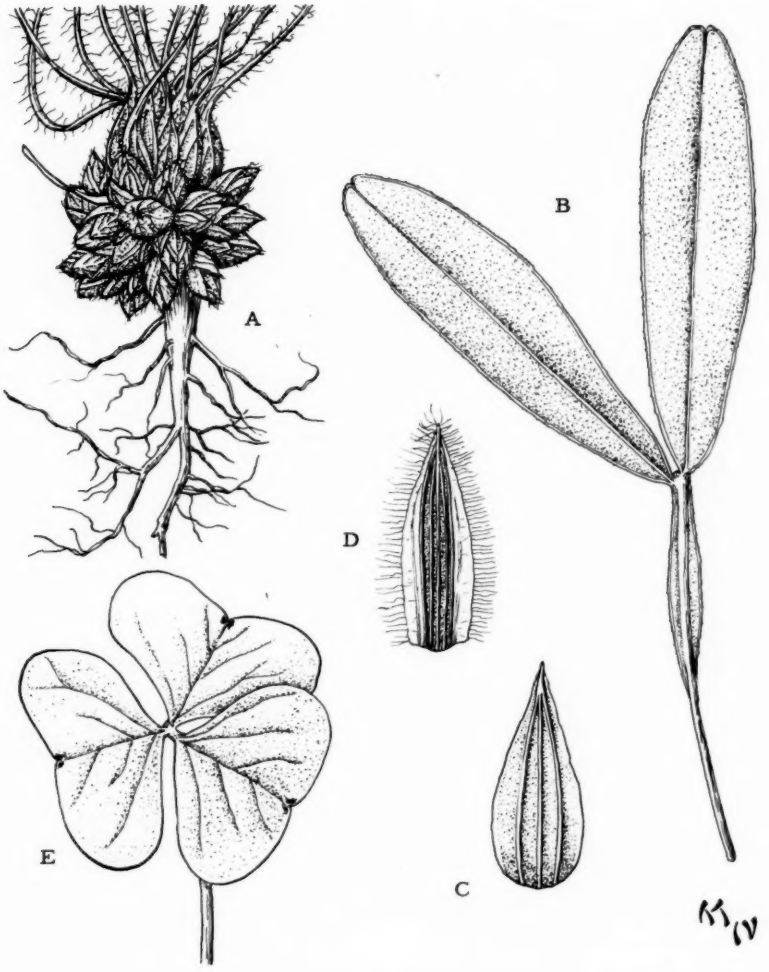


Fig. 5. A, Oxalis corymbosa, bulbs and roots x 1 3/5. B, Oxalis fabaefolia, leaf x 4/5. C, Oxalis Drummondii, bulb scale x 3. D, Oxalis latifolia, bulb scale x 3. E, Oxalis violacea, leaf x 2.

22. Leaflets wedge-shaped to strongly 2-lobed, callose spots absent on the lower surface at the sinus.

    23. Peduncles and petioles glabrous; bulb-scales 3-nerved (Fig. 5C) . . . . . O. Drummondii

    23. Peduncles and petioles hairy; bulb-scales with several nerves (Fig. 5D) . . . . . O. latifolia

21. Plants with scaly rhizomes, bulbs absent (Fig. 7) . . . . . O. Regnellii

Although special comments need not be made on all the species included in the key, some remarks are in order, especially in the case of certain names used here which differ from those found in Hortus Second or those commonly employed by trade catalogues.

Oxalis braziliensis Loddiges ex Knowles & Westcott, The Floral Cabinet, and Magazine of Exotic Botany 2: 67, 1838. (Oxalis brasiliensis Loddiges, Loddiges's Botanical Cabinet 20: t. 1962, 1833, nomen subnudum), Knuth, in his monograph of the genus Oxalis in Das Pflanzenreich 95 (IV. 130): 389, 1930, has included O. braziliensis in his list of doubtful species. If he based his opinion on Loddiges' plate, he surely would not have known for certain the characteristics of this species because Loddiges did not give any description of the species nor does his plate illustrate diagnostic features from which the species can be determined. Knowles and Westcott, however, fully described and illustrated this species and referred to Loddiges' name and illustration, thereby validating Loddiges' name. Since Knuth did not cite Knowles and Westcott, he probably did not know about their publication. The spelling used by Knowles and Westcott has been retained.

Oxalis corymbosa DeCandolle, Prodromus ... 1: 696, 1824. (Oxalis Martiana Zuccarini, Denkschriften der Königlich Bayerischen Akademie der Wissenschaften [München] 9: 144, 1825). Both of these names occur in the literature because there is some confusion as to which of these names was published first. According to Young (Watsonia 4: 62, 1958), the correct name is O. corymbosa DeCandolle because "DeCandolle's name outdates the better known martiana by a few months." The date of Zuccarini's publication is usually given as 1823-1824; however, according to the Catalogue of the Library of the British Museum (Natural History) 5: 2400, 1915, the date of publication was 1825.

Oxalis crassipes Urban in Hildebrand, Die Lebensverhältnisse der Oxalis-arten, p. 28, 1884, is reported to be in cultivation in the United States. It was first described from plants cultivated in the Botanical Garden in Berlin; the original plants were said to have probably come from South America. Oxalis crassipes is obviously related to O. rubra, and Blasdale (Natural Horticultural Magazine 36: 285, 1957) conjectures that they might be the same species. At any rate, the problem requires further study to determine whether these are two species or only members of one species.

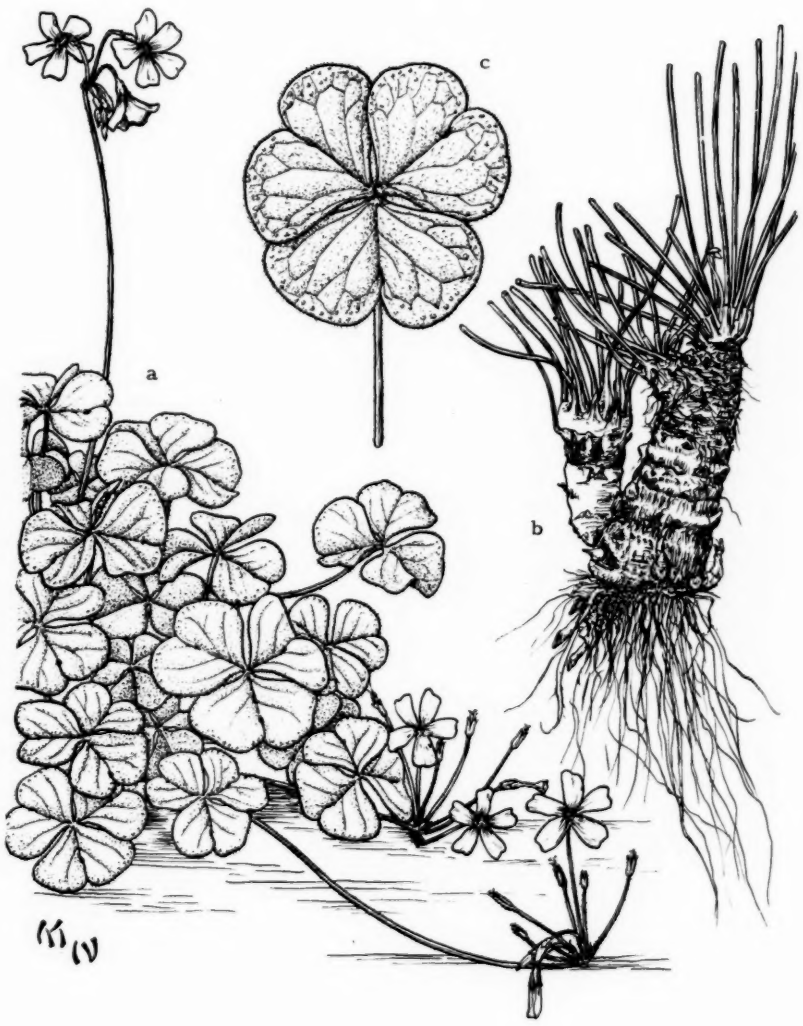


Fig. 6. Oxalis rubra: a, habit x 3/5; b, rhizome x 4/5; c, leaf x 1.

The following four species are natives of South Africa, and since all of them have been studied thoroughly and discussed in detail by Salter, his conclusions have been adopted here.

Oxalis fabaefolia Jacquin, Oxalis, Monographia iconibus illustrata, 62, t. 27, 1794. (Oxalis asinina Jacquin, Oxalis, Monographia iconibus illustrata, 59, t. 24, 1794). Salter considers these two taxa to be conspecific, and he has chosen to combine them under the name O. fabaefolia.

Oxalis Bowiei Herbert in Lindley, Edwards's Botanical Register 19: t. 1585, 1833. (Oxalis Bowieana Loddiges, Loddiges's Botanical Cabinet 18: t. 1782, 1831). Loddiges' earlier name was not accompanied with a description nor can his illustration be considered diagnostic, therefore it must be rejected in favor of the later but properly published epithet Bowiei.

Oxalis Pes-caprae Linnaeus, Species Plantarum ed. 1, p. 434, 1753. (Oxalis cernua Thunberg, Dissertationes ... De Oxalide p. 14, 1781). Bermuda buttercup. Since these names obviously have been applied to the same species, Linnaeus' name must be accepted because it is earlier.

Oxalis purpurea Linnaeus, Species Plantarum, ed. 1, p. 433, 1753. (Oxalis variabilis Jacquin, Oxalis, Monographia iconibus illustrata, 89, t. 52, 1794). The problem here arose from an early mistake in the application of the name purpurea and the failure to recognize that O. purpurea had been described by Linnaeus and not Thunberg.

The following is a finding-list of species names in the acaulescent species of Oxalis, which are likely to be found offered in the trade in the United States. Valid names are underlined.

Oxalis
- Acetosella Linnaeus
- adenophylla Gillies
- asinina Jacquin :: O. fabaefolia Jacquin
- Bowieana Loddiges :: O. Bowiei Herbert in Lindley
- Bowiei Herbert in Lindley
- braziliensis Loddiges ex Knowles & Westcott
- cernua Thunberg :: O. Pes-caprae
- corymbosa DeCandolle
- Deppei Loddiges ex Sweet
- Drummondii Gray
- enneaphylla Cavanilles
- fabaefolia Jacquin
- flava Linnaeus
- latifolia Humboldt, Bonpland, & Kunth
- lasiandra Zuccarini in Otto & Dietrich
- lobata Sims

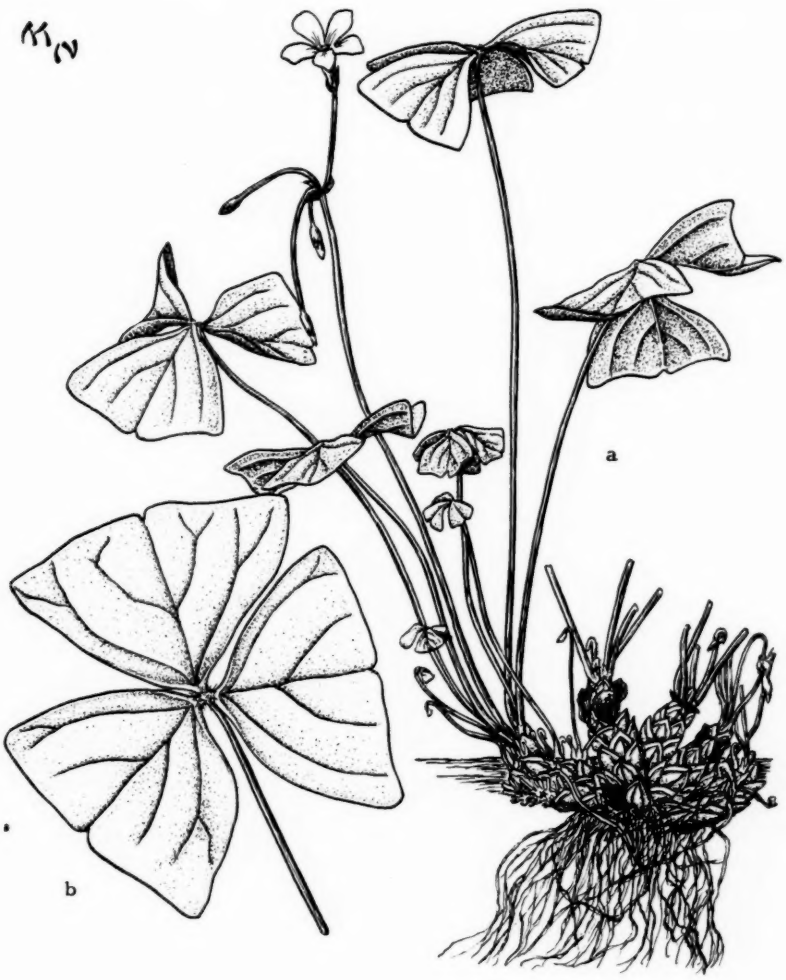


Fig. 7. Oxalis Regnellii: a, habit x 4/5; b, leaf x 1.

magellanica Forster
Martiana Zuccarini :: O. corymbosa DeCandolle
melanosticta Sonder
oregana Nuttall
Pes-caprae Linnaeus
purpurea Linnaeus
Regnellii Miquel
rubra Saint Hilaire
tetraphylla Cavanilles
trilliifolia Hooker
variabilis Jacquin :: O. purpurea Linnaeus
vespertilionis Torrey & Gray :: O. Drummondii Gray
vespertilionis Zuccarini :: not known to be in cultivation
violacea Linnaeus

Garden in Your House, by Ernesta Drinker Ballard. xiv + 256 pp., 91 black-and-white photographs, colored frontispiece. Harper and Brothers, New York. 1958. $5.95.

New books on house plants appear fairly regularly, but this is a particularly good one for the amateur who wants accurate information without technical jargon. It is based on Mrs. Ballard's personal experience in growing hundreds of kinds of plants under the various conditions to be found in the average home as well as in the small attached greenhouse, so her observations and comments are realistic and personal. In fact, her very personal style is one of the charms of the book. The body of the book is Part Three: "Selection of Plants," in which over 500 species and varieties are listed alphabetically by genus and are briefly commented on. For each species is given the scientific name, the familiar synonyms, and common name, if any. The descriptions of the plants are not detailed, since they are not meant as means for identification, but amount, instead, to "appreciations" of their value as house plants. Part One: "The Culture of Indoor Plants" and Part Two: "Some Indoor Gardens" include the detailed information necessary for success. Part Four: "Finding Lists" has concise information on plants for various exposures and temperatures, soil mixtures, sources of supply of house plants, and a list of the literature likely to be of interest to indoor gardeners. Numerous photographs illustrate specimens of a great many of the kinds mentioned and various ways of using plants indoors. Many of the illustrations suffer in lack of detail, unfortunately, through the attempt to include too many subjects in one picture or through overdevelopment or other faulty photographic technique.

W.J.D.

Notes on the Cultivated Compositae
3. Liatris

William J. Dress

Although the genus Liatris is a fairly familiar one in American and European gardens, it is ordinarily represented there only by one or another of three species, L. pycnostachya, L. aspera, and L. spicata. These are the most vigorous and perhaps the handsomest members of the genus, it is true, but at least ten other species, together with several varieties, hybrids, and cultivars, have in recent years been available in the trade or through plant societies which support seed exchange programs. Many of these, besides being interesting variations on a theme, are suited by habit or height for niches in the garden which the more robust sorts cannot fill.

The genus Liatris is entirely North American, some representative occurring in almost every state of the Union east of the Rocky Mountains, and ranging into southern Canada and northernmost Mexico. Altogether, Dr. Lulu O. Gaiser recognized 32 species in her revision of the genus published in 1946 (Rhodora 48: 166-183, 216-263, 273-326, 331-382, 393-412), though some botanists do not recognize as valid quite so many species as this. Some species are variable enough to be subdivided into rather distinct varieties, and there are a number of interspecific hybrids known in the wild.

Three species of what we now know as Liatris were known to European botanists at the time Linnaeus wrote his Species Plantarum, and these three he included in his genus Serratula - S. squarrosa, S. scariosa, and S. spicata (Species Plantarum 2: 818, 819, 1753). Linnaeus' Serratula was a rather motley genus according to modern concepts, however, and many of the species he included in it were later removed by other botanists to other genera. In 1762 the Englishman John Hill set up a new genus for S. squarrosa and S. scariosa and called it Lacinaria, in reference to the lacerate or "torn" apices of the involucral bracts or phyllaries (The Vegetable System 4: 65, plate 46, 1762)[1]; in 1769 he again had occasion to employ the name, but this time published it as Laciniaria (Hortus Kewensis p. 70).

[1]Reference to this name has usually been incorrectly cited: by O. Kuntze, Revisio Generum Plantarum 1: 349, 1891, as "Laciniaria Hill (1762) veg. syst. IV 49 t. 46"; by Dr. Gaiser, Rhodora 48: 167, 1946, as "Lacinaria Hill, Veg. Syst. iv. t. 49 (1762)"; in the International Code of Botanical Nomenclature (1956), p. 274 as "Laciniaria Hill, Veg. Syst. 4: 49. 1762."

According to the rule of priority, then, the correct name for our present genus should be Lacinaria, since this was the first name applied to it as a genus distinguished from Serratula. Apparently through oversight, however, nothing more was heard of the name Lacinaria for over a hundred years, and other names were proposed in the meantime for this genus - Psilosanthus by N. J. de Necker (Elementa Botanica 1: 69, 1790) and Liatris by J. C. D. von Schreber (Genera Plantarum ... Editio octava 2: 542, 1791). As it happened, Liatris was the name that the influential botanists of the nineteenth century took up and that became the established name for the genus. When, eventually, Otto Kuntze resurrected Hill's generic name, using the spelling Laciniaria rather than Lacinaria (Revisio Generum Plantarum 1: 349, 1891), some botanists, including many Americans, acknowledged the priority of Hill's name and adopted it; others, though acknowledging its priority, were reluctant to abandon the long-familiar and well established name Liatris, and included it in the list of nomina generica conservanda[1] ultimately adopted at the International Botanical Congress of Vienna, 1905, and appended to the subsequently published International Rules of Botanical Nomenclature, 1906. The large group of American botanists who refused at the time, however, to accept the principle of conserving generic names in violation of the principle of priority were not reconciled to this mode of action until the International Botanical Congress of Cambridge (England) of 1930.

It is for this reason that we find Lacinaria (or Laciniaria) rather than Liatris used in a number of important manuals and floras written during those intervening years - works by Britton and Brown, Rydberg, Small, House, and others. On the other hand, American botanists of the Harvard school and those influenced by them had accepted the principle of nomina generica conservanda incorporated in the 1906 Vienna code, and so had employed in their writings conserved generic names, Liatris among them (Cf. the seventh edition of Gray's New Manual of Botany [1908] edited by Robinson and Fernald).

Of the common or vernacular names applied to the genus, gayfeather and blazing-star are probably the most familiar, though button-snakeroot, rattlesnake-master, devil's-bite, rough-root, backache-root, prairie-pine, throat-wort, and colic-root are recorded as being used for at least some species.

The various kinds of Liatris are all herbaceous perennials with erect, leafy, usually slender stems which are seldom branched except, sometimes, in the inflorescence. Below ground, the rootstock in most species is a globose or ovoid corm, though in some

[1]Generic names which, because of long usage and familiarity are preserved for use as exceptions to the strict application of the principle of priority.

it is somewhat elongated or even branched with finger-like projections. The leaves are mostly linear or narrowly lanceolate, but in a few species are broadly lanceolate or even obovate, at least in the basal tufts. The basal leaves produced directly from the rootstock are longer and broader than the numerous cauline leaves which become diminished in length and breadth upward along the stem until they become bracts in the inflorescence. The inflorescence varies, according to species, from long, slender, and spikelike with many small sessile heads to an open racemelike cyme with a relatively few large heads on elongate peduncles. Often, in the spicate or slender racemose type, the lower part of the inflorescence may be branched and therefore paniculate. The terminal or uppermost head in the inflorescence is always the first to open, and the flowering succession is downward and outward as is typical in the Compositae, rather than from the base to the apex, as in true spikes and racemes such as are found in Delphinium, Digitalis, and Lupinus, for example.

Most of the important diagnostic characters, those used in distinguishing one species from another, are to be found in the head itself, especially in the characteristics of its phyllaries, the number of florets contained in each head, the presence or lack of pubescence inside the tube of the corolla, and the degree of plumosity of the pappus hairs. The heads in some species are quite small, in others relatively large, vary from cylindrical to almost globose in shape, and may contain as few as 3 or 4 or as many as 70 florets. The phyllaries or involucral bracts vary in shape, apex, texture, pubescence, and margin, and in some species the longer, innermost ones are colored and petaloid (resembling petals). The florets of all species are normally purple, but white-flowered forms of many species are known. (All the florets are of the disk-floret type - that is, regular and tubular - and there are no ligulate florets.) In some species the inside of the corolla tube, when split open, is seen to be furnished with hairs in the region of the attachment of the stamens, in others the tube is glabrous; this is, admittedly, a character requiring a little patience to work with, but with the aid of a good hand-lens one should be able to see quite clearly whether there are hairs present or not, and the character does seem to be a reliable one. In the pappus, the primary bristles or setae have secondary, lateral hairs upon them; when these lateral hairs or cilia are relatively short (3 to 6 times as long as the seta is thick), the pappus is called barbellate, and when the cilia are relatively long (15 or more times as long as the seta is thick), the pappus is termed plumose. The two types are illustrated in figure 8. It is not ordinarily necessary actually to measure the cilia and the seta diameter, the difference between one type and the other being sufficiently great that the eye (again, with a hand-lens) can readily distinguish them.

Key to the Cultivated Species of *Liatris*

1. Pappus barbellate, the lateral cilia of each seta only 3-6 times the diameter of the seta.
   2. Heads 3-20-flowered, oblong, with phyllaries mostly erect, sometimes recurved.
      3. Corolla glabrous within the tube (though filaments may be pubescent).
         4. Phyllaries obtuse or acuminate, appressed and never recurved.
            5. Stems stout, stiff, and tall, 6-15 dm. high; heads [4-]10-flowered, phyllaries usually obtuse. . . . . *L. spicata*
            5. Stems slender but erect, 5-8 dm. high; heads 3-5-flowered, phyllaries acuminate. . . . . *L. acidota*
         4. Stems 6-15 dm. high; phyllaries acuminate and recurved at tips. . . . . *L. pycnostachya*
      3. Corolla hairy on inside of tube.
         6. Heads 5-15-flowered.
            7. Pappus as long as corolla tube. . . . . *L. graminifolia*
            7. Pappus only half as long as corolla tube. . . . . *L. Helleri*
         6. Heads 3-5-flowered. . . . . *L. gracilis*
   2. Heads 15-70-(or more) flowered, globose or hemispheric, phyllaries erect or recurved.
      8. Middle and inner phyllaries with broadly scarious and erose to lacerate margins.
         9. Heads about 15-40-flowered, the terminal one not larger than the lateral ones; phyllary tips spreading, with margins strongly reflexed; corolla tube pubescent inside. . . . . *L. aspera*
         9. Heads (lateral ones) 40-70-flowered, the terminal up to twice as large; phyllary tips appressed, flat or margins only slightly reflexed; corolla tube glabrous inside. . . . . *L. ligulistylis*
      8. Middle and inner phyllaries herbaceous (green) and ciliate, with narrow or no scarious margin; corolla tube pubescent inside.
         10. Cauline leaves usually 25 or fewer below the inflorescence; heads mostly 25-40-flowered; phyllary tips appressed or spreading. . . . . *L. scariosa*
         10. Cauline leaves usually more than 25 below the inflorescence; heads mostly 30-70-flowered; phyllary tips appressed. . . . . *L. novae-angliae*

1. Pappus plumose, the lateral cilia of each seta 15 or more times the diameter of the seta.
   11. Heads 4-8-flowered; inflorescence spicate; inner surface of corolla lobes quite glabrous.
      12. Phyllaries with prolonged petaloid (colored) tips; corolla quite glabrous within. . . . . *L. elegans*
      12. Phyllaries herbaceous (green) and appressed except for the free tips; corolla pilose within the tube. . . . . *L. punctata*
   11. Heads 15-60-flowered; inflorescence cymose-racemose; inner surface of corolla lobes conspicuously hairy.
      13. Phyllaries appressed. . . . . *L. cylindracea*
      13. Phyllaries recurved or loosely spreading. . . . . *L. squarrosa*

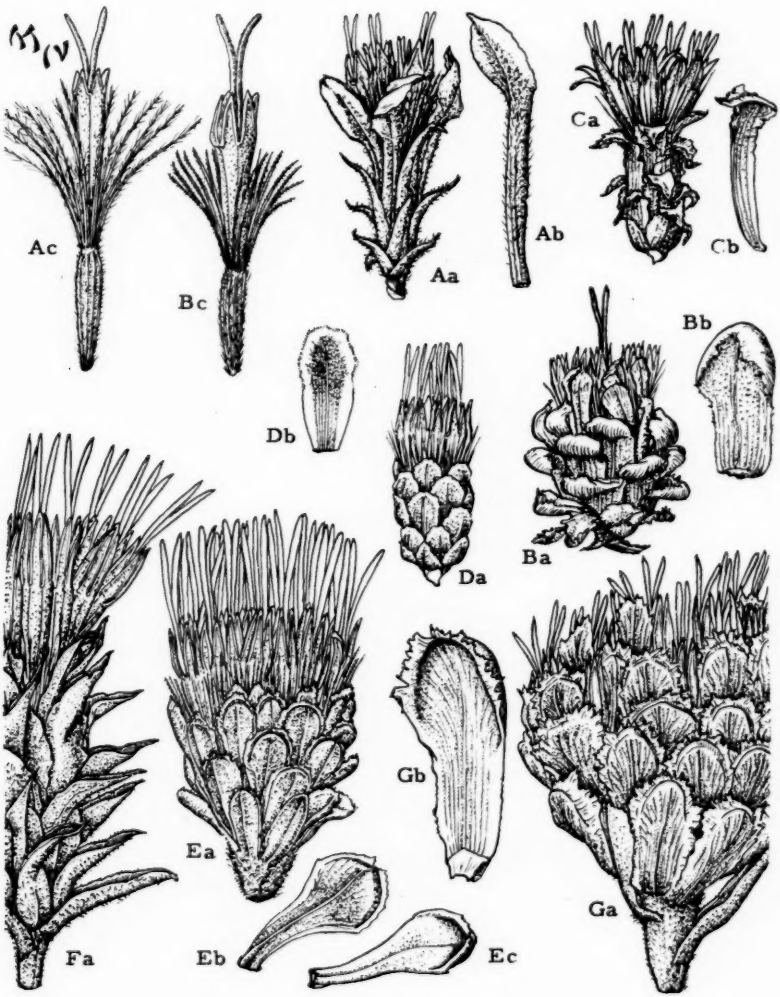


Fig. 8. A, Liatris elegans: a, head x 2; b, inner bract x 3; c, achene, showing plumose pappus x 3. B, L. aspera: a, head x 2; b middle bract, inner face x 3; c, achene showing barbellate pappus x 3. C, L. pycnostachya: a, head x 2; b, inner bract x 3. D, L. spicata: a, head x 2; b, bract, exterior face x 3. E, L. scariosa: a, head x 2; b, middle bract, exterior face x 3; c, same, inner face x 3. F, L. squarrosa: a, head x 2. G, L. ligulistylis: a, head x 2; b, bract, inner face x 3.

Liatris spicata, one of the robust more commonly cultivated species, is often found masquerading under the name L. callilepis, a name of no botanical standing. The stem sometimes reaches a height of 15 dm. and is rather densely clothed with linear leaves up to the inflorescence, which is 1.5 to 5 dm. long and densely spicate, the heads being sessile and 10- to 18-flowered. It is one of the few species found in nature on moist low ground. The typical variety, the one ordinarily found in gardens, has a natural range from Michigan and southeastern New York southward to Mississippi and Florida. The white-flowered 'Alba' which is sometimes offered is no doubt equivalent to L. spicata forma albiflora Britton. A cultivar 'Silver Tips' is described as having lavender florets edged with "silver," producing a "silvery sheen." A more slender variety, L. spicata var. resinosa (Nuttall) Gaiser, with narrower leaves and fewer (4-7) florets per head prefers drier habitats and is more restricted in natural range (Pennsylvania to Florida and Mississippi), and is probably not cultivated. Liatris spicata forma montana (Gray) Gaiser, having a shorter inflorescence 3 dm. or less long and found in the mountains from Virginia to Georgia, may be the plant offered under the name L. montana.

Liatris acidota superficially does not greatly differ in appearance from L. spicata, especially the var. resinosa, but is not so tall, is more slender, and has a shorter inflorescence with even fewer (3-5) florets per head. It is a plant restricted in nature to the coastal plains of Louisiana and Texas.

Liatris pycnostachya is the most frequently grown species of the genus. Though it is not readily distinguished technically from L. spicata except by its recurving, acuminate rather than appressed, obtuse phyllaries, the forms in cultivation are generally more vigorous and showy than those of L. spicata. The white-flowered sort offered as 'Alba' probably does not differ from the wild white-flowered form which bears the unhappily uncommunicative name forma Hubrichtii E. Anderson. The rarely offered cultivars 'Gigantea' and 'Nana' should be, respectively, larger and smaller forms of the typical species if they are honestly named. This species is a plant of midwestern prairies, ranging from South Dakota to Indiana and southward to Texas and Louisiana.

As defined by Dr. Gaiser, L. graminifolia is a rather variable species, native from southern Pennsylvania and New Jersey to Alabama and Florida. The typical variety, which is the one most likely to be found under cultivation, is for horticultural purposes a somewhat more graceful diminished version of L. spicata, with narrower leaves and a more slender inflorescence of slightly larger and less crowded heads. Variety racemosa has occasionally been available, but apparently only under the names L. dubia or L. graminifolia var. dubia, which are synonyms. It is a slightly more

robust variation, with broader, linear-lanceolate rather than narrowly linear leaves, and larger heads. Cultivars 'Alba' and 'Nana' were listed in the recent past, but are perhaps no longer available.

Liatris Helleri to our knowledge has not been offered in the trade more recently than twenty years ago, but may still be growing in some gardens. It is endemic to the mountains of North Carolina where, growing on exposed ledges, it appears seldom to reach more than 2 dm. in height, according to Dr. Gaiser. Because of its dwarf stature in the wild, it may once have been considered a possible subject for the rock garden, but it does not retain this dwarf habit under cultivation. Plants in the garden may reach 6 dm., perhaps more. The distinctive feature of the species is its very short pappus, which is only half as long as the corollas and is scarcely visible above the top of the involucres.

Liatris gracilis differs from all the preceding species in having the individual heads borne on slender peduncles as long as or longer than the heads themselves and often at right angles to the rachis of the inflorescence. The 3-5-flowered heads are among the smallest to be found in the genus, but are numerous, often panicled at the base of the inflorescence which may be as much as 6 dm. long. The stem is usually 7 to 11 dm. high, the leaves are short and slender, and the whole effect is more airy, graceful, and elegant than in the more densely spicate species. Liatris gracilis inhabits the sandy pine woods of the southeastern United States from South Carolina to Florida, a derivation which probably precludes its use in those parts of the country with heavier soils and a colder climate.

Another of the more frequently cultivated species is L. aspera, though it is rarely to be encountered in gardens, nurseries, or seed lists under this name. It most commonly passes under the name of L. scariosa, which is a different species according to Dr. Gaiser's interpretation of the group. Liatris aspera is often quite a tall plant, sometimes 18 dm. under cultivation, though more likely to be about 12 dm. high, with numerous linear-lanceolate or narrower leaves, and a rather open spicate inflorescence of 20 or more - even 70 or more in cultivated plants - sessile or shortly pedunculate heads. These heads are rather large, compared with those of previously mentioned species, 1.5 to 2.5 cm. broad, globose, with 25-40 florets per head. The white-flowered cultivated form called 'Alba' is equivalent to the forma Benkii (Macbride) Fernald, the white-flowered form rather commonly found in the wild with the purple-flowered type. 'September Glory' and 'White Spire' are selected purple- and white-flowered clones, respectively, and perhaps 'White Feather' belongs here also. Liatris aspera occurs natively from North Dakota to Ontario and Ohio in the north to Texas and Florida in the south.

Both geographically and morphologically the previous species intergrades with what, following Dr. Gaiser, we may refer to as true L. scariosa, with a range from southern Pennsylvania to Georgia and Alabama. This has generally a somewhat shorter stem, fewer leaves (of which the basal often have broad, even obovate, blades), and a more open inflorescence with heads on peduncles. White-flowered forms may occur, but none have been named and described.

Liatris novae-angliae resembles L. scariosa very much, and is essentially the northern counterpart of it, replacing it in New York and New England. It has more and narrower leaves, on the average, and sometimes has even larger heads than that species. White-flowered forms should bear the name forma albiflora Shinners. Dr. Gaiser has called this species L. borealis, a name published by MacNab in 1835 and based on a specimen so-labeled in Nuttall's herbarium. However, it is not clear that this name really does apply to this taxon, since the type specimen seems not to be extant and the published description is a bit equivocal. Var. Nieuwlandii (Lundell) Shinners (by Dr. Gaiser considered to be a hybrid of uncertain parentage and called L. × Nieuwlandii (Lunell) Gaiser) is a rather more robust plant which continues the range of the species inland to Wisconsin and Missouri. It is apparently occasionally cultivated.

Closely related to and closely resembling the preceding three species is L. ligulistylis, the most western in distribution of these, with a natural range from Wisconsin to southern Alberta on the north and northern New Mexico on the south. It is not so tall-growing (to 6 dm.) as the others, and has fewer though larger pedunculate heads measuring 2 to 3 cm. wide and containing up to 70 florets. The terminal head is usually larger than the lower, lateral ones, often twice their size. Unlike the other three species, the corolla tube is glabrous inside.

Any of the four immediately preceding species may be expected to turn up under the name L. scariosa, for conservative botanists in the past (e.g., Gray, and later editors of his Manual before the eighth edition) and some today have preferred to consider them all representatives of one widely variable species. When they are distinguished, it is chiefly on the basis of the nature of the involucral bracts, as described in the key and illustrated in the accompanying figure.

Liatris elegans is a very handsome species, for in well-developed plants the stems may be 15 dm. or more high, with the inflorescence constituting half the length. The heads are sessile or very shortly pedunculate, often paniculate in the lower part of the inflorescence, and, though few-flowered, are attractive for a considerable time because of the brightly colored scarious tips of the

innermost, longest phyllaries. These are of the same color as the florets, either purple or white, though an interesting and unusual variation with lemon-yellow florets and bracts, named forma Fisheri by Standley, was once found near Copperas Cove in southern Coryell County, Texas. The leaves are numerous, but narrow and relatively short. This is another southern species, found growing most often in sandy pine barrens, from South Carolina to Florida and westward to Arkansas and Texas.

Sharing with L. ligulistylis the westernmost limits of the range of the genus, L. punctata has a wide distribution from Wisconsin and Illinois to the eastern side of the Rocky Mountains, from Alberta to New Mexico. It is a rather short plant, mostly less than 8 dm. high, the stem well clothed with narrow linear leaves and the inflorescence comparatively short and dense.

The last two species with which we are here concerned - L. cylindracea and L. squarrosa - have, perhaps, less horticultural merit than most. Both have many rather long linear leaves and rather open racemose inflorescences, though sometimes the heads are sessile. The heads themselves are broad-cylindrical, 1.5 to 3 cm. long, and not very numerous, sometimes as many as 20, occasionally only one. Liatris squarrosa ranges widely from Delaware to South Dakota and south to Texas and Florida, whereas L. cylindracea has a more northern distribution, from Ontario and western New York to Minnesota and Missouri.

The following is a finding list of specific epithets which may be found applied to the Liatris material in cultivation outside of botanical gardens and special collections. As usual, the valid names are underscored.

Liatris

- acidota Engelmann and Gray
- aspera Michaux
- borealis Nuttall ex MacNab :: L. novae-angliae
- callilepis :: listed name; plants grown as such usually are L. spicata
- cylindracea Michaux
- dubia Barton :: L. graminifolia var. racemosa (DeCandolle) Venard
- elegans (Walter) Michaux
- glabrata Rydberg :: L. squarrosa var. glabrata (Rydberg) Gaiser
- gracilis Pursh
- graminifolia Willdenow
- Helleri Porter
- intermedia Lindley :: L. cylindracea
- Langloisii (Greene) Cory :: L. pycnostachya
- ligulistylis (Nelson) Shulz Bipontius
- macrostachya Michaux :: L. spicata

montana Hort. :: probably L. spicata forma montana (Gray) Gaiser
novae-angliae (Lunell) Shinners
praecox :: listed name
pumila Loddiges :: L. spicata, but as used in the trade may apply to a low-growing form of some other species
punctata Hooker
pycnostachya Michaux
scariosa (Linnaeus) Willdenow :: This name is commonly applied also to the taxa herin called L. aspera, L. ligulistylis, and L. novae-angliae.
sphaeroidea Michaux :: L. aspera
spicata (Linnaeus) Willdenow
squarrosa (Linnaeus) Michaux
× Weaveri Shinners :: hybrid, L. aspera × L. punctata

Fruits for Southern Florida, by David Sturrock. 194 pp., with colored frontispiece, 22 line drawings, 4 maps. Published by Southeastern Printing Co., Inc., Stuart, Florida. 1959. $4.00.

Simply and straightforwardly written, accurate but non-technical, this slim book will interest all horticulturists and home gardeners living in southern Florida, should be of use in similar subtropical regions elsewhere, and will tantalize and inspire gourmets everywhere. Mr. Sturrock discusses, family by family, well over a hundred fruits of proven or probable worth in southern Florida, including descriptions of the plants as well as their fruits, their cultivation and limitations, uses, and analyses of the mineral and vitamin content of each fruit. There is a chapter on climatic factors in Florida, supplemented by four maps, and chapters on culture, diseases and insect pests, recommendations for commercial and home garden plantings, uses of the fruits, and possibilities for improving them. The black-and-white sketches, by Ruth E. Sturrock, are simple but strong, and artistically pleasing as well as illustrative.

W. J. D.

The Garden Huckleberry and the Sunberry

Jorge Soria V.[1]
and
Charles B. Heiser, Jr.[2]

The plant sometimes known as the "garden huckleberry" and offered by several seed dealers in the United States has also gone under the name Solanum guineense Lamarck. Inasmuch as this name is preoccupied by a Solanum guineense of Linnaeus it is necessary to propose a new epithet.

Solanum intrusum Soria, nom. nov.

[S. guineense, fructu magno instar cerasi Dillenius, Hortus Elthamensis 366. t. 274. f. 354, 1732]

S. nigrum var. guineense Linnaeus, Species Plantarum 1:186, 1753.

S. guineense Lamarck, Tableau encyclopédique . . . Botanique . . . Illustrations des Genres 2:18, 1793; Dunal in DeCandolle, Prodromus 12:48, 1852; not S. guineense Linnaeus, Species Plantarum 1:184, 1753.

This species is readily recognized by its large fruits (10-15 mm. in diameter), its thick brown anthers, thick petals, and large ovate, nearly entire leaves. This taxon is commonly considered a native of Africa, but details concerning its distribution are not known.

In his Cyclopedia Bailey treated this species as a variety of Solanum nigrum, but it is readily distinguished from the latter on the basis of the characters given above. Both species are hexaploids, and, since it has been impossible to obtain seed in repeated crosses between the two species, it is assumed that they are genetically isolated.

Solanum intrusum has sometimes been confused with the sunberry or wonderberry (S. Burbankii Bitter) of Luther Burbank. It has not been possible to obtain living material of Burbank's plant

[1]Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica
[2]Department of Botany, Indiana University, Bloomington, Indiana

Fig. 9. Solanum intrusum.

for comparison, but a study of herbarium specimens of "sunberry" from the Bailey Hortorium and the Missouri Botanical Garden indicates clearly that the two are not the same. Burbank (Luther Burbank, His Methods and Discoveries . . . 7:105-133, 1914) claimed that he obtained his sunberry from a cross of "S. guineense" and "S. villosum." Since Solanum villosum Dunal is a tetraploid species, the resulting hybrid would be a pentaploid and could not be expected to breed true as claimed by Burbank. More than 50 crosses between two races of S. villosum and two races of S. intrusum have been attempted, and though some fruits were formed they were all devoid of good seed.

Although it seems highly improbable that the sunberry is the result of a cross between S. villosum and S. intrusum, it is, of course, conceivable that Burbank misidentified the plants with which he was working. He states that his plants of "S. villosum" had green mature fruits, whereas all forms of this species known to us have fruit yellow or orange in color at maturity. There was considerable skepticism in regard to Burbank's "new creation" (See W. L. Howard, Chronica Botanica 9:446, 1946), but it is possible that Burbank could have obtained true-breeding hybrids through spontaneous polyploidy following hybridization. In crosses between S. Roxburgii (4n) and S. americanum (2n) and between S. villosum (4n) and S. nodiflorum (2n), sterile triploids were secured by the senior author. Two plants of the former combination and one of the latter spontaneously doubled to produce fertile hexaploids. These examples illustrate how readily "true breeding hybrids" may be obtained in this group. Additional evidence bearing on the origin of Burbank's plant will have to wait until living material can be obtained.

Garden Plants in Color. Vol. 1, Trees, Shrubs, Vines, edited by Henry T. Skinner. Text, map, 438 illustrations; loose-leaf or bound. Published by Sweeney, Krist, and Dimm, Portland, Oregon. 1958. $42.50.

This work is meant to fill the nurserymen's need for a book illustrating in color the plants that they grow and sell. It is a substantial book, with pages measuring 8 1/2 by 11 inches and is divided into 8 sections: Trees, Deciduous Flowering Shrubs, Broadleaved Evergreen Shrubs, Azaleas, Camellias, Rhododendrons, Coniferous Evergreens, Vines and Ground Covers; an index concludes the work. Each section consists of several pages of introductory text concerning culture, landscaping use, etc., of the group, followed by 12 to 28 pages of colored photographs and very brief descriptive accounts of selected species, varieties, and cultivars. Almost every plant is, helpfully, rated for hardiness. In addition to Mr. Skinner, 7 well-known and experienced horticulturists have contributed to the text. The publishers are a firm of horticultural printers and publishers, so many of the illustrations in this book will be familiar to those who have perused the more lavishly illustrated of the catalogues of certain West Coast nursery firms. In fact, it is to the West Coast nurseryman and landscape architect that this work may prove useful, for the plant material included is that which is to be met with more or less commonly in California, Oregon, and Washington. Though there is an implication that the book will be valuable to nurserymen everywhere, when one considers the proportion of the included plant material which can successfully be grown in the central and northeastern United States, the usefulness of the book to nurserymen in those regions does not seem commensurate with its high price. This high price, though no doubt justified by the cost of production, will also effectively preclude realization of the expectation, expressed in the Foreword, that "the home gardener can use [the book] to advantage in landscaping the home."

W.J.D.

ERRATA, VOLUME 6 (1958)

Pages 120 and 122, line 1 of legend: for "×2400" read "×1025."

Page 138, lines 40 and 41: for "Hapalanthus Jacquin, Selectarum ... 1763" read "Hapalanthus Jacquin, Enumeratio Systematica Plantarum 1, 1760."

Page 144, line 12: for "Callisia repens Linnaeus" read "Callisia repens (Jacquin) Linnaeus."

Page 144, lines 13 and 14: for "Hapalanthus repens Jacquin, Selectarum ... 1763" read "Hapalanthus repens Jacquin, Enumeratio Systematica Plantarum 12, 1760."

Page 152, line 12: for "Mantreaux Royal" read "Manteau Royal."

Page 156, line 46: for "L. × Parkmannii" read "L. × Parkmanii."

Page 157, line 10: for "Parkmann's" read "Parkman's."

Page 161, lines 16 and 17 of text, and page 163, line 23: for "T. Parryi × T. spathulata Nuttall" read "T. Parryi × T. condensata D. C. Eaton in Parry."

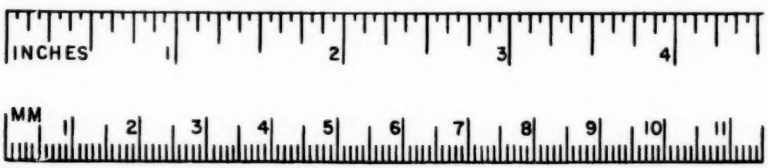
Page 199, line 2: for "140,000 sets" read "40,000 sets."

ABBREVIATIONS USED IN BAILEYA

ann.	annual	dm.	decimeter	lf.	leaf
bien.	biennial	fl.	flower	lft.	leaflet
br.	branch	fls.	flowers	lvs.	leaves
brt.	branchlet	flt.	floret	mm.	millimeter
caps.	capsule	fr.	fruit	per.	perennial
cl.	clone	ft.	foot	segm.	segment
cm.	centimeter	hort.	horticultural	st.	stem
cv.	cultivar	in.	inch	sts.	stems
diam.	diameter	infl.	inflorescence	var.	variety

METRIC - ENGLISH EQUIVALENTS (approximate)

6 mm. - 1/4 in.	10 cm. - 4 in.	10 mm. - 1 cm.
12 mm. - 1/2 in.	1 dm. - 4 in.	10 cm. - 1 dm.
25 mm. - 1 in.	3 dm. - 1 ft.	10 dm. - 1 meter
2.5 cm. - 1 in.	10 dm. - 1 yd.	
5 cm. - 2 in.	1 m. - 39 in.	



Published at the Bailey Hortorium
of the New York State College of Agriculture,
a Unit of the State University of New York,
at Cornell University, Ithaca, New York